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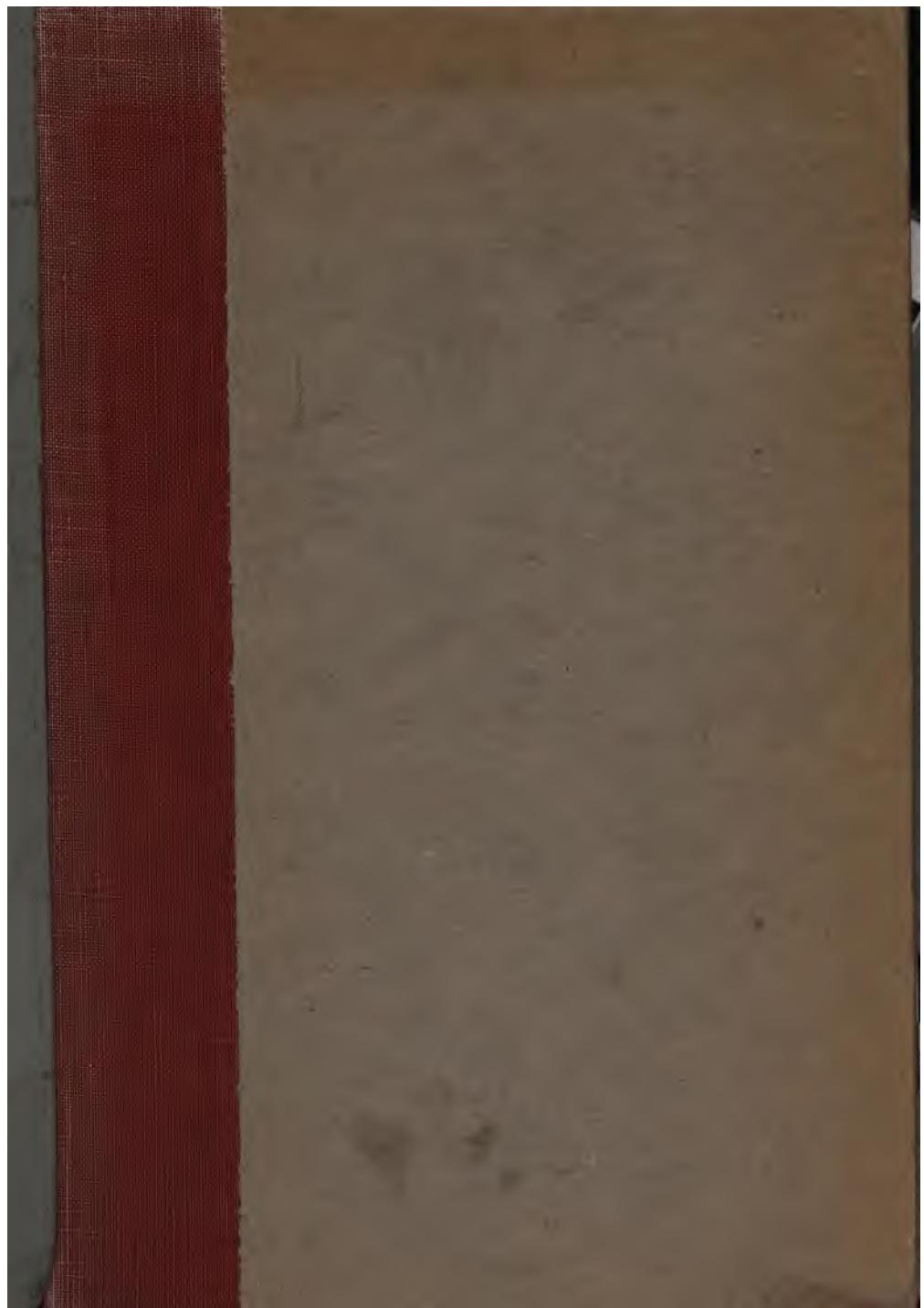
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*LANDSCAPE
GEOLoGY*

HUGH MILLER

WITH ILLUSTRATIONS

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LANDSCAPE GEOLOGY



“The bodily eye
Amid my strongest workings, evermore
Was searching out the lines of difference
As they lie hid in all external forms,
Near or remote, minute or vast ; an eye
Which, from a tree, a stone, a withered leaf,
To the broad ocean and the azure heavens
Spangled with kindred multitudes of stars
Could find no surface where its power might sleep

Add that whate'er of Terror or of Love
Or Beauty, Nature's daily face put on
From transitory passion, unto this
I was as sensitive as waters are
To the sky's influence, . . . obedient as a lute
That waits upon the touches of the wind.”

—WORDSWORTH.

“ How entirely our judgment of some kinds of art depends on knowledge,
not on feeling !”—RUSKIN.

“ A landscape-painter, said Goethe, should possess various sorts of knowledge. It is not enough for him to understand perspective, and the anatomy of men and animals ; he must also have some insight into mineralogy, that he may know how to express properly the character of the different sorts of mountains. It is not, indeed, necessary that he should be an accomplished mineralogist.”—ECKERMAN.

Dai

LANDSCAPE) C. Branner
) GEOLOGY ^{1895. 29, 95}

A PLEA FOR THE STUDY OF GEOLOGY
BY LANDSCAPE-PAINTERS

(See Trans. Roy. Soc. Sc.
Vol VI, pt II, 1892 pp. 123 -

BY

HUGH MILLER

OF H.M. GEOLOGICAL SURVEY

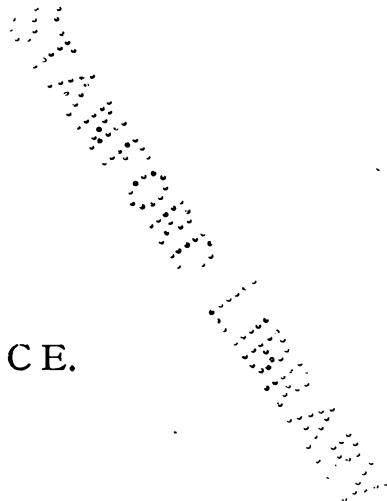
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P R E F A C E.

THE following pages are in no sense an attempt to advocate realism in rock-painting. Personally I believe I prefer idealism to realism, breadth to detail, the best French art to the best recent English—a preference natural enough in any one who spends much time in the analysis of scenery, as the geologist does.

But neither the real nor the ideal is to be attained without true knowledge. Whatever may be the artist's idea of truth, or nature, or art, *that* he should have knowledge enough to attain. When I remember Turner and Ruskin, and their days and weeks of constant and intense communion with Nature; or young Constable, on his tower, studying what he used to call the "natural history of the skies"—the changes of the atmosphere, which he afterwards painted so exquisitely; or Nöel Paton, forgetting his meals as he lay on the grass studying

"effects"; or when I think of the Lake poets, addressing themselves for whole seasons to study Nature's face feature by feature; or Tennyson's long practice in the art of drawing a whole picture in one line of poetry,—I am convinced that the ideal is only to be approached through the real, and that sound knowledge is the basis of everything that is worthy to live.

The chief object of this address was to ask the question, Whether geology has not *at least* the same claim to the attention of the landscape-painter that human anatomy, by general usage if not general consent, has to that of the sculptor? Whether the Greeks studied anatomy or not I do not know; rightly or wrongly, it is an essential part of the training of every sculptor and figure-painter of modern times. Even in its narrowest sense, viewed as anatomy—the anatomy of the earth—there is no argument against the study of geology by artists that will not equally apply to the study of human anatomy. But geology has a much wider scope than mere anatomy: in this wider sense I believe it to be singularly adapted for the study even of those artists who, with Mr Ruskin, object to the study of artistic anatomy of every kind. For it is a science not of dissection but of observation—not of the class-room but of the hillside; it appeals in endless ways to the reason and the imagination, tempting the mind to spread its wings into many

picturesque regions both of time and surface, both of the past and the present. It might, in a word, be to the landscape-painter, if properly studied, very much what history is to the painter of historical subjects.

We have been told that art has nothing to do with science, and that the best modern artists, and all the Old Masters, got on admirably without knowing any geology. But Turner's aptitude (if we take Turner as representing the moderns) for discerning structure and expression in rocks—the result, we all know, of much hard work—is no more an argument against some training in geology than Shakespeare's untaught genius is an argument against the Universities. And let any one who refers us further back than Turner compare the Old Masters where they have *disregarded* Nature with the Old Masters where they have *followed* Nature, and then say whether they are not superior at every point when taught of the Great Mother. Not a few of the Old Masters, disregarding Nature courageously—or with the courage that comes of entire unconsciousness of danger—give us at least great effects and a fine romanticism, and, Mr Ruskin notwithstanding, are not altogether to be judged by modern standards. The artists of our modern schools, on the other hand, with few exceptions, do not dare to offer us unnatural effects: the age will not allow it; everything is brought to the standard of “Nature,”

and judged there. If they are not willing to copy Nature, they are willing at least to accept her “tones” and “values.” But I venture to think that, as a rule, they have hardly yet learned enough of her to make her their teacher as Nature *could* teach, still less to make of her their servant, as it has been given to some great painters to do. Never, I believe, until they have done this, will they rival the Old Masters on their own ground.

So far as geology is concerned, I am satisfied that there is only one way open to them,—study, knowledge. I would have preferred, had it been possible, not to use the word science at all. It leads inevitably to something like controversy. But whatever it may be called, I humbly think that this study can best be approached, not as science, not as investigation and inquiry, but as a kind of Nature-teaching. Like all the teachings of Nature, it will be found to be fraught with poetry.

There is, I am aware, a wholesome artistic horror of scientific distinctions and specific scientific details, and it is founded on a correct instinct. But, are geological and other scientific details, after all, so much more dangerous than details of any other kind—details of costume or furniture or *bric-a-brac*, or the antiquary’s “rowth of auld nick-nackets”? You will see half-a-dozen pictures in our Scottish National Gallery that suffer from over-elaboration of figure and design—on armour, vases, old books,

furniture, and the like—wearing the eye with its multiplicity; but among the few good landscapes there (and miserably few they are), you will not discover one that suffers from excess of detail in geological structure. Nature's greatness, in fact, belittles *all* knowledge: but the antiquary, as we all know, may forget the man; and the *costumier*, may remember only his clothes.

In concluding this too long preface—suggested by a correspondence in the 'Scotsman' which ensued on the reading of my address—I must express my regret that what I had to say was not altogether free from the personal element. It could scarcely have been otherwise. There seemed to be no alternative but to select examples from the present school of landscape-painters, and from the ranks of the foremost members of the profession. I am glad to think that there is not one of the distinguished artists to whom I referred whose reputation could suffer from anything that I could say.

LANDSCAPE GEOLOGY.

SINCE the occasion of Professor Alleyne Nicholson's address to this Society,¹ early last winter, one of the most interesting of the public events that have taken place in Edinburgh has undoubtedly been the meeting of the Art Congress. I believe I am right in saying that Art has hitherto been the most reticent of the professions. As a class, artists are fully engrossed by studies which engage the hand and the eye, but not the tongue or the pen—studies which demand nothing less than entire and lifelong devotion. Except for their amiable habit of dining together from time to time, and of occasionally making presidential and other speeches, we should have heard almost nothing about them—from themselves. Until Mr Frith published his amusing ‘Reminiscences,’ I believe there was scarcely such a thing as the autobiography of an artist, if you except the strange memoirs of Benvenuto Cellini, and that quaint and charming autobio-

¹ The Geological Society of Edinburgh.

graphy of Bewick, and, in our own day, the autobiography of Holman Hunt. It was therefore of unusual interest, if only as a revelation of personality, to hear or read papers from the hands of such men as Watts and Briton Riviere. But this is by no means all, even from the popular point of view. The proceedings of the Congress presented us with teaching of a most pleasing kind—that kind in which the teachers are competent men who simply talk together and discuss and debate, while the taught have nothing to do but to listen. A wise old essayist, in an essay “On Regimen of Health,” recommends all such as would study what he quaintly terms *the principles of long lasting*—*i.e.*, of health and long life—to be sure to entertain “variety of delights, wonder and admiration, and studies that fill the mind with splendid objects.” Many of us sooner or later begin to discover—generally, I think, towards middle age—that there is nothing that fills the mind with a variety of delights so measureless, so truly recreative, as the study and love of the beautiful, whether it be in Nature or in daily life.

“ Its loveliness increases ; it . . . still will keep
A bower quiet for us, and a sleep
Full of sweet dreams and health and quiet breathing.”

There is perhaps a time coming when, as a matter of mere “regimen” and ordinary education, there may be more cultivation, not only of the *pleasures* of taste, but of what I may call the artistic *understanding*,—the art of conceiving of things artistically, or in their artistic completeness. And it may come all the sooner because of this annual Art Congress.

For my own part, I read the pages of the 'Scotsman,' during the days of the Congress in Edinburgh, with unusual interest. There was one subject, however, of which I saw no mention whatever—a subject which a body of artists meeting in this country of uplands and highlands, in a city owing so much of its beauty to the rocks and heights among which it is set, might perhaps have been expected not altogether to forget. I refer to the relation which may be held to subsist between the study of landscape-painting and the study of the rocks,—using that word in its wide geological sense, as including everything from granite to gravel,—that form the basis of landscape. I observe that at the recent meeting in Birmingham, again, there were papers read on almost all the relations of art to modern life—art in relation to industry, art in relation to technical education, art as applied to jewellery, advertisement as a field for design, &c.; but of geology still not one word, and of science of any kind only the merest mention.¹ This subject, which I have described as Landscape Geology, is one that has of late years been much, and, I believe, unjustly neglected; and I have ventured to select it as the subject of the annual address to this Society.

But it may be asked, What business have I, a mere working geologist, to take up a subject that demands so much culture, so much refinement of taste, so much special study, such wide knowledge? I have to confess at once that I am not, in any sense, an expert in art. I cannot pretend to be

¹ See Appendix II., Mr Briton Riviere on Science in relation to Painting.

anything more than one of those average persons who take delight in a good picture and a fine scene. But the subject has very seldom been treated of,—hardly at all since Mr Ruskin wrote the first and fourth volumes of ‘Modern Painters,’ now from thirty to forty years ago,—and perhaps never by one who is by profession a geologist. If only on this account, there may be found an artist or two who may care to spend a vacant hour in listening to a geologist, who in pursuit of his profession spends a great part of his life among the scenes and inmost haunts of Nature, and who counts it as one of the grand acquirements of his life that he has learned to look upon Nature, however humbly, with something of the artist’s eye. Of one thing, at least, I am sure: in referring to painters I desire to speak with the greatest respect and deference—I might well speak of many of them with something like affection—as of men whose works have been to me for years an abounding source of the purest pleasure.

But it may be objected that science and the fine arts cannot be, and ought not to be, brought together. “Science and poetry,” it has been said, “are to a nicety diametrically opposed;”¹ and poetry is, of course, the atmosphere and breath of the fine arts.

Certain it is that science and the art of the landscape-painter deal with different aspects of Nature, and assume different attitudes of mind. There will little work be done while the geologist is opening his heart to the beauties of the landscape; nor will the

¹ Dr John Brown, *Horæ Subsecivæ*, pp. 229-231. See Appendix I.

picture gain in "feeling" while the artist is engaged in analysing the peaks of the mountains into cones of denudation, or the rocks of the waterfall into rhombs and lozenges, defined by planes of stratification and jointing.

But I venture to demur to the statement that science and the fine arts, or science and poetry, are at opposite poles. There is a whole region in which, like the halves of the sphere, they inevitably come into contact. Science, however distasteful it may be to the young and the æsthetic, is only the careful investigation of the truth of Nature; and of the truth and the poetry of Nature the exquisite art of the landscape-painter is an *expression*. Science deals, as it were, with the body, the structure, the habits, and finds it impossible, happily, to forget the mind that informs them; art deals, as it were, with the face and the expression of the face. But do I assert too much if I say that in the study of landscape art, as in that of the human physiognomy, to understand the expression of the face you must know something of the body? Certain it is that without some knowledge of the body, its parts and habits, and what an old writer might term its *humours*, and needs, and cravings, as well as of the mind that informs it, and without a constant (though perhaps unconscious) reference to these,—the human face would be an enigma, and physiognomy, whether as an instinct or a science, could have no existence. Is it pressing analogy too far to say that it is not altogether otherwise with the art of the landscape-painter, who is the student and interpreter of the face and expression of Nature? Can he show us

the face of Nature without any knowledge of her structure, and the expression of Nature without any knowledge of her ways? He is to delineate for us the stream, the cloud, the bird, the tree, the rock: can he delineate them in ignorance that *this* is flowing water, and *that* floating vapour? can he delineate them so well caring nothing for the habit of growth or *kind* of the tree, nor for the meaning of the lines that seam the iron front of the rock?

Such is not the teaching of art in any other of its departments. The historical painter cannot know too much of history, even of its springs and hidden sources: it is not enough for him diligently to study costumes. The painter of *life* cannot know too many of the phases and deepest emotions of life. The portrait-painter will paint incomparably better portraits if he have a knowledge of men and their physiognomy that will confer on him the gift of reading the lines of the human countenance,—the signs of the habits and struggles, and noble or mean ambitions, that mould the character. It is only the landscape-painter who is advised to remain in healthful ignorance of all the deeper workings of the Nature which he studies, lest, forsooth, he should make geological structure-diagrams of his pictures, or mayhap come incontinently to despise the storm and the lightning as exhibitions merely of the electric spark or of a measurable wind-motion. I venture to say that, if he be not able to think and reason for himself upon the subjects with which he deals, he will by just so much be less the interpreter and more the copyist, and without extraordinary powers of faithful

observation will miss half the suggestions and half the refinements of the landscape. "A mere copier of Nature can never produce anything great."¹

The truth is that the landscape-painter, like his brother artists, cannot know too much, *if he know it aright*. But it is also true that the artist, above all men—the poet alone excepted—has need to assimilate his knowledge perfectly. What in the preacher is but a touch of pedantry, and what in the good lawyer may only serve as an amusement to the bench, in the artist is dangerous, if not destructive, to pure artistic feeling. And thus instinctively the artist learns to wear his knowledge "lightly, like a flower"—or, rather, he learns to *wear* it not at all; for since his art is undoubtedly a magic synthesis of the objective and the subjective,—of Nature with himself,—his knowledge, that it may not in any way intervene between Nature and himself, becomes, as it were, a part of his *own* nature. And therefore it is true that science should be presented to him, not in its incomplete stages as inquiry and induction, but, so far as possible, as full and perfect knowledge. The laws of perspective will become to him—mere matter of common-sense; his knowledge of anatomy and geology and botany will bear the same relation to his mind that anatomy itself does to the human body,—being something entirely out of sight, the very fact of it forgotten—*clothed upon* with the beautiful. I cannot believe that science will rob the Academies of any eminent Associates or great works. Nature is greater than our knowledge of

¹ Reynolds, Fourth Discourse.

Nature, by whatever name we call it; and looking into her unfathomable eyes—all the more intense in their meaning, all the more alluring, and all the more fathomless to him whose knowledge is great—the true artist will no longer be conscious of his little knowledge, or the pride of his acquirements, but, abased in the hopelessness of showing her to us as she is revealed to him, will see only her transcendent and incommunicable beauty. “I could name half-a-dozen painters who have been ruined by science,” says one who must have known hundreds of artists in his time, “but they were all men of feeble artistic gifts to begin with.”¹

Far be it from any one to apply pure truth or rigid science to the study of landscape. They who cry out for truth, nothing but truth, scarcely realise to what it would bring them. The human eye is not a surveyor’s instrument. “Every hill,” it has been said, with much truth in the seeming exaggeration, “is half the height it looks; every curve looks twice as round as it is; every interesting feature is insignificant.” Exaggeration unconsciously minglest with every feeling of admiration, wonder, or awe. The human mind, I repeat, is not a mere clinometer or measurer of angles; nor are the hills, even to the geologist, masses solely consisting of beds of rock laid at ascertainable angles, with divisions and breaks called joints and faults, and having certain cognisable outward shapes, the result of denudation. Geology is not what we look for in landscape. We look for the soul of the truth, not the whole body, still less the skeleton.

¹ P. G. Hamerton, ‘Thoughts about Art,’ p. 367.

Last summer I was sailing up the coast of Norway, between the islands and the mainland, towards Bergen. On the outer side were miles of naked rocks, rising, so far as I can recollect, to perhaps six or eight hundred feet above the sea. Their glaciation, marked by their curved and ice-worn outlines, was as distinct as in a diagram. They were traversed by upright planes of jointing laid as closely—so it seemed in the distance—as they could have been drawn by a fine pen. The whole rock had the appearance of having been cut straight downwards into thin slices, and then carefully put together again in such a manner that you could still see the joinings traced in dark lines—for it was a dull day—as if by the ink of the etching-pen. The planes of stratification or foliation were perfectly defined, marking the rock into slabs laid sloping towards the mainland, and shelving to the sea like artificial embankments of stone, up which the waves were sliding. It was a remarkable geological diagram.

It was singular, but it was the mere skeleton of landscape. Its lines were those of a ground plan or elevation; their intersections were like those of a scaffolding. There can have been few on board the steamer who did not turn with pleasure to the other side of the ship. *There*, on the mainland, the atmosphere was such that the structure seemed to be defined by comparatively few lines,—but they were master lines: hills rose behind hills, and towered into mountains; there were snow-gleams from misty heights, amid a whole world of chiaroscuro; and in the foreground lay the naked rocks and the changeful sea. The one was an excellent

geological model upon the natural scale, the other was mere "mountain truth" expressed in the highest spirit of art. Yet I venture to think that the one would greatly help in the interpretation of the other; and for a very obvious reason — the one was constructed, so to speak, *upon the lines* of the other. The one was anatomy, the other was the living presence; the one was the skeleton, the other was body and soul.¹

¹ I am not unmindful that there must be many things which appear differently to the eye of the artist and the eye of the geologist. The eye sees what it brings with it the power of seeing, and, it may be added, the proclivity to see. Passing through some of our Highland valleys, for instance, the geologist may be tempted to regard the morainic mounds, with which they are sometimes for miles bestrewn, with a certain impatience, as little better than mere geological *litter*. They are, in truth, in one sense only a sort of rubbish-heaps left behind by the glaciers of the Ice Age. They are often the most irregular mounds, thrown into groups as waggon-loads may be shot into heaps, with but little beauty in their short curves and little colour in their spare *cleaving* of sombre heather; the arid subsoil breaking through the thin peat, and the peat mingling with it like grime.

But if you will accept her leading, Nature will not allow you lightly to esteem anything of hers as litter. You have been following the stream downwards. The hummocks, the moraine mounds, which the inevitable eye of the poet so long ago saw to be

"Hillocks dropped in Nature's careless haste,"

before there was a science capable of investigating them, have become dappled with birchen shaws and covered with the feathery juniper, with its sprays of waxen green; the loose stones, half buried in bushes, are hieroglyphed over with moss. See these green knolls of exquisite sylvan loveliness, where the ferns wave by day and the fairies dance by night! See these deep hollow coverts underneath the flaky foliage, where the mavis sings to his mate! Nature, once again, will not allow you to dismiss any of her works with contempt as mere rubbish-heaps. You have climbed to the crown of some higher knoll, and you cast your eye back at the moraines of the upper valley. And lo! they too have been transformed. A haze has fallen over them, and a cloud rests above the

There is only one other aspect of the general relation of science to landscape-painting which I need refer to here. I find that Mr Hamerton, the well-known editor of the 'Portfolio,' distinctly admits that science has its own proper place in the training of the artist. The efficiency of the artist, he says, depends in a great measure on his vivid recollection of form and effect; and, by assisting the memory to retain these with a precision not otherwise attainable, science is of the same sort of use to him that the map is to the traveller when it informs him where the places lie, when it guards him against mistakes, and assists his topographical memory.¹ And again, it is to the artist what the rules of grammar are to the writer.² This is true, so far as it goes, and true especially of the sciences which Mr Hamerton names—*i.e.*, perspective, optics, and anatomy. But there is a much deeper truth beyond it. Science may become much more to the artist than mere chart or mere grammar; it may be to him what knowledge is to the understanding, reasoning, mind—something that may exercise, vivify, and fertilise his mind every conscious moment, lending to the eye a deeper insight and a more "precious seeing." It may seem to stand aside in the supreme moments of creative activity, but it is even then scarcely more separable from

haze, and a shaft of sunlight falls through the cloud. Their own outlines are as black as jet. Where there seemed to you before to be only meanness, there is now mystery; and what seemed scarcely worth a glance from the geologist, is now a subject for the reverent study of the artist. Nature has asserted herself as the Supreme of Art.

¹ P. G. Hamerton, 'Thoughts about Art,' p. 357.

² Ibid., Portfolio Papers.

him than his own powers of reason. Nor is exact truth at war with poetry,—and here I return to the point with which I started. “Poetry,” says Wordsworth, “is the breath and finer spirit of *all* knowledge; it is the impassioned expression in the face of all science.” If he be not endowed with any large measure of that “finer spirit,” the artist who sits close to Nature’s feet, and who knows her ways, will at least be a correct topographer, or a faithful naturalist; his love of nature may even shed over him a something hard to distinguish from genius itself. But if he possess that spirit, that greatest of endowments, he will, like Tennyson and Browning, the great scientific poets of the age, stand upon the supreme attainable altitude of the vantage-ground of truth, from which alone he can command all the visible horizon, ascending, as if at will, to the purest heights, or revelling amid the gloom and the cross-lights of the most shadowy recesses.¹

Perhaps the best commentary on the relation of science to landscape-painting is to be found in the works of artists themselves,—in those studies the *science* of which—I now refer exclusively to geology—is so simple that ordinary faithful observation and good common-sense can take its place. I turn, for instance, to Mr H. W. B. Davis’s picture in this year’s Academy, “The Picardy Dunes.” It is an excellent example of faithful delineation of the “topographical” kind. Every hollow, almost every dimple, among these low sand-hills tells of wind and blinding drift—as the snow-wreaths do after a winter’s storm, or like the waves of the open ocean

¹ See Appendix III., Science and the Poets.

when the wind has gone down and the sea heaves under a quiet sky. It is now calm. The lie of the *bent* will tell you from what direction the wind came : you can almost fancy you detect those broken stalks that whirl round and round in the breeze, describing circles on the sand. The rabbit-burrows will tell you that the wind has not been violent ; they will be buried out of sight in the next gale, like the track which the sheep are leaving. Yet the picture is not suggestive only of aridity and of blinding blasts of dry sand. The sheep can find pasture, and have milk for their lambs. There are trees which suggest the neighbourhood and the hand of man ; they will remind you of the *Pinus maritimus*, which has checked the march of the sand over many a league of southern France, causing the sandbanks to be clothed with evergreen woods, and the surface of the sand itself with softest mosses. Many of these things may have been in the mind of the artist ; to me his picture is eloquent of them. He has certainly studied very carefully the geology, in its widest sense (*i.e.*, I believe, its *artistic* sense), of the sand-dunes.

I turn to another picture, and this, as it happens, is also by Mr Davis¹—his pleasing study, “A Placid Morning on the Wye.” It leads us away to a spot where a few stones lie across the stream, almost like a natural *weir*, or a place which you would choose to lay with stepping-stones. The quiet river, bearing almost unbroken the reflections of cattle that are

¹ I regret that I have described two pictures from the same hand. I chose them not altogether from their merits—considerable as these are—but as illustrations.

stepping into it, glides down a short slope, perhaps some hidden outcrop of rock,—bending into a sudden rush, and darkening, with a gleam among the dark, as it turns; and then it breaks; there is a white fringe of foam stretched across from side to side,—a dance of foaming water,—a spurt thrown up here and there into the air; and then the stream quiets down into ripples flecked with foam, and glides on as before; and the sudden outgush of sound, as you may fancy, shows you how calm is the day.

Now I must confess that an appreciable part of the charm of this picture, to me, comes from a detail apparently very trifling — the ease with which the water glides among and over the loose stones of its bed. They are smooth,—you see it by their wet gleam; and the water scarcely breaks upon them: their plane sides *are sloped gently towards the current*. Exactly upon the same principle the marine engineer lays his stone embankment and builds his sloping jetty, at an easy angle towards the waves; in order that in washing up the incline they may encounter the smallest possible modicum of resistance—wasting their force in mere sliding. And here, by a kind of natural selection under the influence of the water, the stones of the stream do exactly the same thing for themselves. They are under the same law under which the mist, clinging to the hill, drifts in sloping wreaths before the mountain breeze, or the bird floats sideways on the wind,—watch it how it dips its wing to let the current glide over it—how it is flung away to leeward when the wind catches it from below,—the same

that determines the shape of waves of water, and ripple-marks in sand, and the moulding of the curves of ice-worn rocks. Details such as these are not mere *et cetera*. They are the illustrations of great laws and principles. The river will not glide with all the grace of nature if the simple stones in its bed do not slope to meet its flow.

For the sake of those, however, whose inclination it is to undervalue pictures such as the two I have partially described, as mere careful delineation,—mere “topographical” painting,—I take an example from one of the most idealistic productions of Turner—his extraordinary creation *Quivi Trovammo*, the Dragon of the Garden of the Hesperides. I refer here only to Mr Ruskin’s plate in ‘Modern Painters,’¹ which, as he explains, is a sketch on the steel adapted for the purposes of his work. I have not seen Turner’s original for many years.

The dragon is almost in the act of raising himself on to a rock, and lies partly in a hollow of its side. His claws clutch it frightfully; the hind limb stretches far forward to grip the edge of the stone, with a hideous suggestion of tension and irresistible strength. His small crocodilian head is the very spirit of evil.

You see at once that the rock consists of a hard and ancient gneiss, ribbed and gnarled at the surface. The ribs of the rock have the same direction, and as much as possible the same character, as the wrinkled and stony rings—the broadest of them scarce broader than an iron quoit, that encircle the monster’s body. A cunning carver might have hewn them both from

¹ Vol. v. p. 303.

the same stone. The rock and the dragon are *as if of one kind and one age*. The rock is of that primary kind which all through the century has been taken as the product and almost the type of mysterious fiery processes carried on in the very depths of the earth; and the dragon is—"that old dragon." It is a strange touch of genius.¹

But there are in geology the materials for a thousand touches of symbolism as effective as this. The day may come when they will be more often applied and more fully understood: it will then be no longer necessary to argue that science and poetry are not "to a nicety diametrically opposed."²

I need not seek to multiply instances. It will some day be conceded, I repeat, that there is a whole world of knowledge to furnish them without limit. But there is, I regret to say, a reverse side from which my subject compels me to draw one or two illustrations. Some excellent artists there are,

¹ In the original I find that the gnarled appearance of the rock disappears. Turner seems to have liked to paint gneiss—he appreciated its ribbed strength and its sinuous lines; but this looks more like granite. The idea of unity between the rock and the monster, however, is quite as strong in the picture as in the plate. The side of the top-heavy crag on to which he has crawled, and where, with intense watchfulness, he remains, might almost do for part of the body of another and greater dragon.

² It is curious to note how shallow have been the arguments on the affirmative side of this question. The views into time and space, glimpses of which have been afforded us by astronomy and geology, have been on every hand characterised as wonderful. It is equally generally admitted that these sciences are fitted to take an important place in the training of the imagination—and a very important place, I believe, it will one day be recognised as being. And yet, they are diametrically opposed to poetry. As if *wonder* and *imagination* could be far from *poetry*!

close in touch with Nature in many respects, who seem to have and to prefer a geology of their own, the works and ways of which, and I will even add, the *poetry* of which, are not at all those of Nature. There is one well-known painter of Highland scenery, an R.S.A. of well-earned distinction, who, as I have observed, has an affection for painting boulders;—sometimes they form his foregrounds, sometimes they dot his hillsides. Now, if we were to seek for poetry in rocks, it might perhaps *most* readily be found in those strange masses of stone—strewn broadcast over the hills, or scattered from the hills over the plains—that have been let fall, so often among strange surroundings, from the grasp of the ice which, it is now part of common knowledge, once covered the face of this country. Even their scientific names—boulders, erratics, perched blocks—suggest something strange. You see them standing on the verge of precipices; you meet them lying like huge roc's eggs in solitary hollows; you find them like some kind of memorial-stones, preserved, for curiosity's sake, among corn-fields and pastures. To the country people of Scotland they have always been instinct with wonder and rude poetry. They have been flung, as many a legend tells, by giant hands from distant crags; or they have been transported by the black art; or they have been dropped where they lie by the Evil One himself. There is scarcely a noticeable “erratic” or group of erratics in the whole south of Scotland that has not its own expressive name: Samson's Putting - Stane,—the Auld Wives' Lift,—the Witches' Stepping-Stanes,—the Warlocks' Burdens.

But in the canvas of this eminent artist, so far as I have seen, the strangeness and the poetry seem to vanish. His boulders, to put as fine a point upon it as possible, have the beauteous semblance of a flock at rest—being indeed, in plain words, as like one another as sheep, or peas and beans, or marbles, if you imagine these objects to be roughish, greyish, of different sizes, and covered with an invariable glaze. Now, regarded from our present point of view, this want of individuality and expression marks a distinct degeneration of feeling. It was with other sentiments that our fathers and our ballad-poets regarded these foundlings of Nature. Nor is the blame, I fear, in any way to be laid to the door of science. The boulders of this artist's canvas are no more geological than they are poetical: they have not even the aspect, like a sandstone boulder lying out on a limestone rock, of a thing out of place.

For one other illustration of this less agreeable part of my subject, I turn to a group of blocks (not boulders) that occupy the greater part of a study of Hagar in the Wilderness, recently exhibited by a well-known R.A. The blocks occupy, I said, the greater part of the picture, and they become, therefore, what rocks or stones seldom are in landscape, almost *more* than accessories. They are intended to furnish the great secondary idea of the study—utter desolation, stony despair. Yet there they are, without mass or weight, hardness or boldness, or even so much as proper confusion; they are not even like real stone. The forsaken woman is represented as shrinking, with clasped hands down-

wrung, close in to the side of the one huge block, as if to escape from the cry of her boy. It would be an effective idea, if only the great stone were well drawn; but unluckily there is a kind of lintel-shaped slab interposed which remarkably resembles some rude garden-seat or some "rest and be thankful" by the wayside; on this she is seated—very uncomfortably; the great block itself has an unfortunate resemblance to the artificial rock of a photographer's studio.¹ Other blocks, apparently intended as thrown in confusion, on the left, have a certain resemblance, I observe, to the panels on a door. As an inevitable consequence of all this ineffectiveness, the central figure, which ought to appear as if lost amid the deepest desolation of the desert, is more like that of an actress surrounded by the furniture of the stage.

Now I am quite sure that any painter of this artist's eminence could have done much better than this, if he had thought it worth while to study the positions, or what I must call the *attitudes* of the fallen masses on any rugged hillside. It is singular how few of them look like mere inert masses; they look what they are—blocks arrested in the very act and attitude of falling: some of them sliding down the slope longways, in the line of least resistance—perhaps with their heavier end first; others as if actually overbalancing and toppling over; others with an appearance of holding back, almost as if rearing—these are the masses against which others have afterwards fallen, so that they seem, by a trick

¹ This is, or used to be, a block of wood covered with French leather, the puckerings of which represented the joints of the stone.

of the associative faculty, as if pushing back in the press ; and here and there some cyclopean mass may be seen held up by a multitude of others, as if by a hundred hands. Their position, on a slope of 25 or 30 degrees, with the bank clear away below them, heightens the apparent imminence of their situation. The ground has often slipped from their lower sides—many of them thus appear to overhang ; or again, it may be heaped against them from above, and they may then seem to bear what is known in some parts of the country as “the weight of the hill.” All these appearances affect the mind of the curious observer. A fleet of fishing-smacks in a gale, scudding close-reefed before the wind, or careening till their masts are level with the fronts of the billows, is not more full of varied expression than the fallen blocks on a hillside. Even when they are viewed from the extreme distance, clinging to the hillside, “like the small dust of the balance,” they appear as if caught in the very act of dropping, and all but actually in motion still.

It is no part of my desire to suggest to the artist how to make use of details like these ; he can make use of them in numberless ways of which I can have no conception. But permit me to give one more illustration. I take it this time, not from art, but from legend.

There is a strange medieval legend called the “Amen of the Stones,”—the story of an aged apostle, wandering from place to place, quite blind, and led by a little boy, but preaching as he went the Word of God and the Gospel of the new Name. The story has been told in English verse, so simply and concisely, by a sweet poet of the south of Eng-

land, that I employ her words as much better and more direct than my own:—

“And it befell, that to a lonely vale
 O’erhung and compassed with huge blocks of stone
 The child did guide his footsteps; and thus spake
 (Less with an evil purpose than the light
 And idle thoughtlessness of boyish jest):
 ‘Here, father, here are many men that wait
 To hear thy preaching !’

Then the old man roused
 The strength that was within him, . . .
 Exhortèd, warned, rebuked and comforted.
 And when, as ever was his wont, he closed
 The holy lesson with our Lord’s own prayer,
 And said, ‘Thine is the Kingdom and the Power
 And Glory evermore’—then rang a sound
 As of a thousand voices thro’ the vale,
 ‘Amen, Eternal God ! Amen, Amen !’
 Then the boy trembled, and he cast him down
 Before the old man’s feet, and told his sin.
 And the blind priest made answer to him thus :
 ‘Hast thou not heard, my son, should men be mute
 The very stones would cry aloud ? . . .
 Play with God’s Word no more, for it is quick
 And powerful, sharper than a two-edged sword,
 And if men to its voice make stone their hearts,
 Will for itself make human hearts from stone.’”¹

I have at times given myself pleasure in imagining the scene of the striking story thus simply told. I have imagined the *valley* of the stones,—a great vale, with its slopes rising into lofty walls of rock dimly pillared, and lost far above in a vault of clouds. A flood of light comes down the valley from the evening sun, touching with its radiance some of the intricacies of the cloudy roof. There are deep shadows in far-off recesses of the sides,

¹ Poems, by Emmeline Hinxman (2d edition), p. 119.

and indistinct shafts of light and tracks of haze,
like the light in a cathedral, cast

"Down sidelong aisles and into niches old."

At the nearer end there is a pile of rock standing rather by itself—not much different from many that you may see in any valley, but such as in this scene you cannot mistake. For in front of it, as if before an altar, is the blind apostle, his sightless eyes raised towards the light, and full of the divine fervour of his mission; and beside him is the child, pale with affright. It is the moment of the Response. All around and far up the slopes is the vast concourse of stones, like the waves of the sea in the evening, when every hollow is a deep shadow and every wave raises itself like a living thing. The multitude is instinct with the appearance of motion arrested in suspense. It is like an assemblage that has risen to its feet and that is straining as if to get nearer—leaning over as if to fall, crowding as if drawn irresistibly towards the centre; and every here and there is one that stands as if pushing back in the throng to save himself from being thrown forward.

There are certainly the materials of a great picture in this story; and the artist who will paint it as it deserves will do much to silence those "undeserved scorns," according to Mr Ruskin, "that are flung upon the most familiar of our servants—stones."¹

Thus far I have endeavoured to enforce and illustrate two positions, and I have deemed it necessary to treat them in detail.

¹ Modern Painters, vol. v. chap. xviii.

1st, That Science and Art or Science and Poetry are not diametrically opposed, but that there is a wide region in which they come into living and inseparable contact; and, 2d, That in the special science of geology—even in the patient study of the loose stones and tumbled *débris* of the surface—there is much that the landscape-painter will find to add enormously to his grasp of the truth of Nature and to the force of his illustration and symbolism.

In what follows, I go on to speak of rocks and masses or mountains of rock:—

1st, Of mountain form.

2d, Of expression in rocks—including expression of texture, structure, and individuality;

and then I will venture a few words on the subject,

3d, Of teachers and studies.

First, then, with regard to *mountain form* as now understood by artists in landscape.

Of the general idea of mountain form and “mountain truth,” as shown in the outlines of all good artists of recent date, I am glad to express, as a geologist, my unqualified admiration. Mountains are no longer depicted, as they were by some of the earlier landscapists, as mere heaps and burdens of rock and stone laid upon the surface of the earth. They are generally recognised as having a connection—graceful, or noble, or majestic—with the earth itself. They may be clad with soil and alluvium, with scree, or peat and drift, as the bones are clothed with flesh; or covered with vegetation

as the body is clad with robes; but they are on every hand recognised as the protuberances and unbarings of a structural framework below. And in general, also, they are depicted with perfect truth of feeling—not as rent and torn by disrupting forces from within, but as wasted and sculptured by the forces of “denudation” at work without. It might, perhaps, be shown that this development of the idea of mountain truth in the hands of our noble school of naturalist painters and that of the Nature-poetry of the century in the hands of Wordsworth and the Lake school and their forerunners, side by side with geological science (and let it be remembered that Britain has produced a school of physical geology from which the rest of the world has been content to learn), is not a thing of accident, but that they have all been part, so to speak, of one great Renaissance of Nature. But this is a subject for another hand than mine.¹ What concerns me just now is to ask whether, in spite of all the attain-

¹ It would be interesting to follow out this parallel. Certain it is, that whilst the Continent has produced no Wordsworth and no Turner, it has also produced no geologist comparable to Lyell. It is true, also, that just as there were Nature-poets before Wordsworth, so there were Nature-artists (and mountain truth in art) before Turner—a fact which Mr Ruskin, I fear, has forgotten. Let any one sit down for ten minutes before Cozen’s picture of an Alpine mountain-range in the present Exhibition of “Old Masters” in Burlington House, and in these noble peaks—in their loftiness and in their dimness, and the light on the faces of their crags, and the mist lifting off their snow—he will have before him a study that, in its perfection of form and truth of suggestion (I do not refer to the foreground, nor to the colour, which is almost a monochrome), that might illustrate ‘Modern Painters’ itself. It is dated 1791—about the time Turner first left London.

ments that may be so justly praised, there is not a danger ahead. Already to my eye there begins to be a noticeable repetition and lack of freshness and variety of idea in the canvas of modern painters of the Scottish school. I do not say that it ever amounts to conventionality; but since repetition of idea and loss or absence of touch with Nature tend to *result* in conventionality, I ask whether the danger, if it be a real one, will not be most effectively surmounted by increasing the *breadth* of idea with which the artist approaches this part of his subject.

The elements that make up the structure of all our mountains in this country are simple enough: planes of stratification; planes of jointing; faults, which are joints attended by displacement; cones of denudation; ravines branching up among the cones; crags and precipices; scree, which are always paler than the rock from which they fall; drift, and moraines, and peat, &c. I would fain have the artist able, in virtue of his training, to recognise all these, and to combine them to whatever extent he may deem necessary into such a general idea of mountain architecture as is borne upon the eye to whatever may be his point of view.¹ More than this, I would have him open

¹ It is possible that I have laid myself open to misunderstanding here. Let me guard against being supposed to ask that the artist should *read his ideas of structure* into the mountains by quoting an anecdote of Turner. "Turner, in his early life, was sometimes good-natured, and would show people what he was drawing about. He was one day making a drawing of Plymouth harbour, with some ships at the distance of a mile or two seen against the light. Having shown this drawing to a naval officer, the naval officer observed with surprise,

his mind to ideas of strange vicissitude and awful age in connection with rocks and mountains. It has sometimes struck me as curious how much reverence we have for the antiquity of a ruin, how very little for the vast age of the mountains. Why should we approach the ruin with veneration, and approach the crag with no feelings except those of the moment—pleasure, perhaps, or a pleasing fear of its beetling front and great fallen stones; never any sense of its majesty of antiquity? “We do not ordinarily associate the idea of age with *natural* features; the span of human life, or even that of the existence of the race of men, is too immeasurably little compared with the age of the ‘everlasting’ hills.” Rocks, moreover, are common; fine ruins are few. Ruins are pregnant with human associations; rocks have none. But you remember that old man whom Endymion found sitting “upon a weeded rock” under a cliff by the sea. You remember his robes, “o’erwrought with symbols”—

“Every ocean form
Was woven in with black distinctness: storm
And calm, and whispering, and hideous roar
Were emblemed in the woof: with every shape
That skims or dives or sleeps. . . .
And there was pictured the regality
Of Neptune.”

and objected with very justifiable indignation, that the ships of the line had no port-holes. ‘No,’ said Turner, ‘certainly not. If you will walk up to Mount Edgecumbe and look at the ships against the sunset, you will find you can’t see the port-holes.’ ‘Well, but,’ said the naval officer, still indignant, ‘you know the port-holes are there.’ ‘Yes,’ said Turner, ‘I know that well enough; but my business is to draw what I see, and not what I know is there.’”—The ‘Eagle’s Nest,’ Lecture VII., p. 123.

It is no fable or poetic dream. Such are, in very truth, the warp and woof of the mountains; and, like these, are the symbols of their past history. I do not say that these are truths which will often engage the artist's mind, or that can be expected often to employ his hand, any more than they engage the mind and hand of the poet; but they certainly open to him a whole range of new feeling; and I have *this* confidence in him—that whatever he strongly feels he has the power to make *us* feel.¹

I cannot help thinking that, as a rule, artists look upon rocks as in themselves rather expressionless objects,—little worth the trouble of study,—scarcely better than, so to speak, the lay figures of the landscape, and as such, in almost their only place, and put almost to their only use, when clothed with the drapery of woods and fields, of furze and heather, endued with jewel-gleam of water, and the magic of atmosphere and cloud. It is too seldom that we see a study of rock *per se* in our galleries. We have Alma Tadema's delineations of polished marble, exquisitely cool and true—with reflections that have all the softness of translucency; we have the massive strength of hewn stone in the St Paul's or the St Martin's-in-the-Fields of Mr Logsdail's canvas, with the black stains throwing forward the grey; but seldom, indeed, have we an adequate treatment of the strength, and mass, and majesty of *rock*, or of

¹ It would be foreign to the scope of this paper to do more than merely refer to the rocks viewed as a *cabinet of designs*. But in this department the artist or designer will find the fossil shelves of our geological museums full of the most varied and instructive suggestion.—See 'Testimony of the Rocks,' p. 217.

the contortions of the strata that still seem to writhe in the solid, or even the gentle outcrop that breaks the soft slope of the hillside.

Rocky foregrounds in especial, if I am not mistaken, are rarer in art than in Nature, and simpler. A complex of rock most artists seem to avoid. In what there is presented to us I have seen much honest imitation, and some true insight and genius; but there is also much timidity, much mere copy work, not a little sameness. I am sometimes reminded, indeed, of the Cockney who took a house in the neighbourhood of London, surrounded by trees, and who, when a friend asked him of what sort were the trees, innocently replied, "Oh, well, just the *ordinary* tree, you know." I sometimes think that there is a formation, imperfectly known to the geologist, that deserves to be known as the ordinary rock.

This brings me to speak of rock-texture. May I say that it is one of the first and most essential, and even emblematic qualities of rock or stone, that it should look *hard*. I do not know how to put the statement so mildly as I would like; but rock ought not to resemble wood, or cork, or leather and pru-nella; it ought not, in general at least, to look as if it would melt in the sun or the rain: it should not, if possible, even look as if it were varnished. And, above all, it should not look too like a substance which, by a strange fatality, painted rocks are very apt to resemble—that most inartistic material, putty. No doubt there must be considerable difficulty in painting rocks, with their essential qualities of hardness, and, generally, roughness and dulness of texture, in

such a material as oil-paint. It is almost fatal to their naturalness to be glossy or oily. In thinking over this subject, I observed a note which I had written in one of my recent catalogues. It was placed against the name of a study, not of rocks at all, but of the open shore of the sea, a study entitled "The ribbed sea-sand." The picture was a laborious study of ripple-marks in sand, not quite my own taste in art, but carefully painted. How came it that, in spite of all its care, the ripple-marks seemed as if formed not of sand at all—for sand ought to look as if its grains would move freely at a touch, whether of the fingers or the foot, or the gentle *lifting* of the currents of water that make ripple-marks—but as if done in some substance sticky and sluggish,—resembling mud! The answer seems to be this: that the artist had not quite overcome the difficulties of the material in which he worked. His ripple-marks, being done in oils, looked oily. The same may be said of many specimens of painting in *rocks*.

But this, I regret to say, is not all. In too many instances it is possible to criticise the *form* quite as unfavourably as the texture. I note too many rocks that are shapeless and leaden; too many that are full of lines, but that have their lines really in confusion; too many that, although carefully painted, are like rock-specimens laid out on a table; too many that are scarcely painted at all.¹ I believe there

¹ "Nothing more distinguishes good mountain-drawing (and I will add good rock-drawing) from careless and inefficient mountain-drawing than the observance of the marvellous parallelisms which exist among the beds."—"Modern Painters," iv. p. 218.

is one cardinal objection to much more than half the painted rocks that have been seen in the Royal Scottish Academy of recent years: they add almost nothing to the force of the pictures, except as mere blank masses to relieve the distances. A fact so general cannot be without some good reason. And I fear that there can be but one—want of sympathy with this part of the subject. I venture to believe that this want of sympathy is only the result of want of study—of firm knowledge and easy grasp.

It is hardly worth while to turn aside to argue that rocks are *not* expressionless objects. How is it that they smile upon us in the sunlight, and frown upon us from below the castle? How is it that when you come upon one of these little red crosses cut in the stone of the wayside among the Pyrenees or in Norway—marking some spot where in these lonely places some one has met with death—they seem, on the moment, to close more grimly round? Why do they look down with haggard faces from the side of Glencoe?

One of the most impressive ruins I have ever seen is a round corner tower of Heidelberg Castle,—*die gespraengte Thurm*,—blown up by the French in 1689. One whole side or great segment of the tower has been lifted bodily into the air, and the huge mass now stands detached, with its base thrown outwards and its top hurled over towards the centre, as when it fell tottering after the moment of the explosion. There it stands—what was once its upright wall sloping at an angle of some forty-five degrees, and

the courses of its immense masonry laid aslant, like sloping strata of rock. It is perhaps the most impressive monument of the power and horror of war to be seen in Western Europe; and it is none the less so because it is now half mantled with vegetation, in one of the loveliest of scenes, and beside a lovers' walk.

I believe I have some general idea how a dramatic artist would treat a subject like that. I will not inflict upon you any more description: but I am quite sure that he would not be satisfied with producing a contrast in red stone and green leaves. Only let me say this. The expression of disrupted mass in that broken tower of Heidelberg Castle is a mere incident, if you compare it with the racked and writhing forms of rock to be seen in some of those regions where the crust of the earth has suffered the stress and convulsion of its earlier ages—a stress so enormous, a convulsion so terrible, that they might well seem to have produced, in solid mass of stone, the agonies of an Inferno itself. A history such as theirs is not altogether sealed up in expressionless silence.

Rocks, then, are by no means without expression; but there may be much difficulty in adequately representing it. There are subtleties of form and line as delicate as those that inform the human handwriting,—subtleties of grouping and shading which the genius of a Turner might discern, or which by painful study may be copied, but to which some intelligent knowledge of the subject is surely the best key.

This leads me on to a subject, however, which I

must touch upon lightly—that of *individuality* in rocks and mountains. Rocks, it is unnecessary to say, are of many different characters and formations, such as granite; basalt; gneiss wrinkled and ribbed; splintering slates and quartzites falling into slopes like those of the sides of cones; stratified sandstone—sometimes in shelving ledges such as Bewick loved to draw in many a sweet scene on the Tyne, sometimes in level courses, like those that bar the sides of the mountain pyramids of Assynt; conglomerates; limestones; boulder-clay, and many others;—all of them very different from one another. “Is it too much to ask,” says a well-known geologist, “that the artist shall not give us *slate* where there is only *gneiss*, or granite boulders where there are none?”

Notwithstanding what I have already said, it is a question I do not seek to press. Let but the *expression* be adequately studied, and every artist will answer questions such as this in his own way. Specific differences and distinctions may then look after themselves; and instead of specific individuality we shall have something much better,—*artistic* individuality. I for one have no desire to go geologising through the picture-galleries.

But there is one kind of individuality which it certainly seems desirable, if possible, to maintain. Some time ago I was looking at a painting by a well-known artist whose pictures are always well hung in the Scottish Academy—of a scene on the north side of the Dornoch Firth, at a place called Spinningdale. It showed the opening of a stream among some rocks upon the low shore of the firth.

I had been on the spot a few weeks before; I remembered having admired that dark rock festooned with drooping branches, with the water of the stream turning and dimpling at its foot; I had stood for some minutes upon that little platform of rock within the curve of the stream; I had looked seawards over those stones, with their coating of vivid green weeds, among which it entered the water, and over the firth, veined with currents and dappled with light breezes, to the low hills of the opposite coast. But the hills—what had he done to them! Their familiar curves were changed into a row of knots, to the best of my recollection like the knots of a blackthorn cudgel, placed horizontally opposite the eye. Now I am no stickler for exact topography. The hills of Edderton and Tain are undoubtedly too long and bow-like in their curves. The Cromarty hills are certainly low and small. But I do venture to think that if the artist had used his invention in other ways—selecting his sky, and arranging his distant lights and shadows—he might have avoided the wholesale massacre of these innocents. There is a long shaft of haze, for example, thrown past the shoulder and along the side of the nearer hills from the west—like a faint golden ladder laid aslant—that has often seemed to relieve and dignify their humble outlines. I am aware that a certain licence is claimed, and is always to be conceded. But it ought surely not to be used to the vile offending of the *genius loci*. If the respected artist was set on having points and peaks, where there are only curves and undulations, why not introduce boldly a real Alpine range, with its spires

and domes and *dents* all shining in ivory and gold. Even at Dornoch the Alps may be said to be *in the distance*, accidentally obscured by the accident of earth-curvature and impurity of the air.

It may be hoped, however, that this maltreatment of individuality in mountain form is the last of an early phase in the development of landscape art, and a relic of the time when no landscape would command a price unless it could be described under a topographical title. We may pardon Turner if his Kilchurn Castle, with its plain round towers, would do almost as well for any other castle, or his Ben Cruachan for any other mountain. But we have now, thanks to him, a recognised school of imaginative landscape, and it is not too much to expect that if a picture is given out as topographical landscape, that landscape it shall be.

There is but one other subject to which I would briefly refer before passing on—namely, that of *contrasted* forms and colours in rocks, to which, as to the rest of the subject, I venture to think too little attention is given. An ideal of contrasted forms in rock is perhaps to be found in Turner's Mount St Gothard in the 'Liber Studiorum.' Observe the easy dip of the rocks towards the left,—their downward cleavage, strong, steep, and decisive, in the precipice of the gorge; how the eye follows it down into the depths, and rises with it into the distant aiguilles and the heavenly aerial. Observe too how much depends, in the series of contrasts, upon the rounded form of the boulder at the roadside, which, by the way, seems to have been pushed aside in the making of the mountain road—it is too

near the side to have fallen there. It is curious to notice—I am not sure whether the fact has escaped Mr Ruskin—that the strongest lines and strongest contrasts in Turner's mountain-drawing are exactly those that he might have studied—and doubtless did very carefully study—at home in London, in the interior of Westminster Abbey; the “perpendicular” of Nature, adding loftiness to height and terror to depth, being the vertical cleavage and vertical stratification; the “pointed” Gothic—directing the eye upwards—being the cone of denudation in all stages of its refinement, from the pyramid to the needle; and the horizontal lines, with their suggestion, as Mr Ruskin has so often told us, of present repose and stability, being the plains, level banks, and terraces. In the Mount St Gothard we have all three, the horizontal, however, very subordinate.¹

Contrasts in rock *colouring* I may safely leave with the artists, making but one remark. I do not see why rocks are so often represented as dead-grey and bleak, or brown and sombre, as if the world were made of carboniferous rocks and greywacke. Common stones, when they are wet,—and how much does not all vividness of landscape in this country depend on moisture!—have sometimes the richness of jewels; and I have seen a brilliance of almost vermillion colouring among the precipices of the North Sutor of Cromarty that reminded me of Blake, “the supreme painter of fire.”

¹ Any reproductions of this water-colour that I have seen represent the original (which is preserved in the basement of the National Gallery) rather imperfectly.

I now come to the third and last division of my subject—teachers and studies. It will not, I hope, be supposed that I arrogantly assume my *plea* to have been conceded. Who to learn from, what to study—these are questions I would not of myself have ventured to touch. But it is impossible to forget that an elaborate system of art teaching in geology has already been given to us by one of the most exquisite writers of the age. What artist, with a taste for the artistic in literature, has not in his time drunk deep of the fountain of learning and delight that is to be found in the works of the great master of critical art and English prose to whom I refer? In the science of geology as ministering to art there has been, so far as I am aware, only this *one* teacher. It seems strange that Mr Ruskin should be a teacher in geology. You are aware of the eccentricity of his views on the subject. His ‘Deucalion’ is almost comparable to Mr Ignatius Donnelly’s ‘Ragnarok, or the Age of Fire and Gravel,’ a production not unworthy of the author of the ‘Great Cryptogram;’ and yet, singular to relate, Mr Ruskin, in ‘Modern Painters’—though that great work was written from twenty to thirty years earlier than ‘Deucalion,’¹ and almost in the childhood of geology—has been preserved from serious error as if by nothing less than sheer genius and the direct inspiration of nature. In his exposition of artistic mountain form Mr Ruskin is, and probably will remain, without a rival. But whenever he quits his own proper ground, his geology, as might be expected, is hardly that science as known to the geol-

¹ ‘Deucalion’ was published in 1876.

ogist. He does not even give us the poetry of the science as it was known forty years ago. He hardly seems to believe in or to realise the extreme antiquity of the earth.

Mr Ruskin's geology, moreover, suffers under two disadvantages. First, it is too much the geology of Turner, and, secondly, too much the geology of the Alps. The Turnerian geology is a kind of transcendental or transfigured geology. It is magnificent, and scientific, too, in its way, although he brings the Alps into England, and features of Yorkshire into the Alps, and is, of course, *sui generis*—a great constructive poet—everywhere. But it is surely impossible to recommend Turner's geology as a key to that of Nature.

As to Mr Ruskin's use of the Alps and Alpine geology, there is one cardinal objection to it—his teaching relates to a region remote from the study of our national school of painters. It is perhaps presumptuous to add that the Alps, although they furnish admirable examples of geological dissection, especially in cones of denudation (domes, spires, aiguilles, &c., determined by cleavage, foliation, and jointing), and of course the most tremendous precipices, do not readily lend themselves for the purposes of art, unless on the Turnerian or Dantesque scale. It is a fact which Mr Ruskin's plates are of themselves almost enough to prove, if that were necessary; and all the paintings I have seen, except those of Calame, serve to strengthen my impression of its truth.

To some extent Mr Ruskin's geological work has the qualities both of Turner and of the Alps. It is

of transcendent beauty, and rich in its teachings concerning mountain form; it may fill the minds of artists with the poetry of the mountains in all time coming; but it is certainly not the kind of teaching that helps the student to reason and understand. Mr Ruskin would be the first to admit that the mind cannot rest on externals; it demands imperiously to know the why and the wherefore of things. It demands reasons; and the best way to confuse a reasoning man is to present him with handfuls of loose facts which he cannot connect with one another or with their causes—like hieroglyphics without the reading. Mr Ruskin's own teaching—I say it emphatically—is a teaching that it requires some knowledge of geology properly to appreciate.

Let me repeat, then, that though Mr Ruskin gives us mountain form, and the *poetry* of mountain form, almost in their perfection, it is not the form, and scarcely the poetry, of our Scottish mountains, nor is it in any broad sense the science of the mountains, or the poetry of that science. The explanation of these two last facts, as might be expected, is given in his eccentric work 'Deucalion.' "It seems to me," he says, "that geology tells us nothing really interesting. It tells us much about a world that once was. But, for my part, a world that only once was is as little interesting as a world that only is to be. I no more care to hear of the forms of mountains that crumbled away a million of years ago to leave room for the town of Kendal" (the quotation is from a lecture delivered there), "than of forms of mountains that some future day may swallow up Kendal in the cracks of them." Now I will not say

that there is no truth in this. Mr Ruskin only accuses geology of a lack of human interest; and for my own part, I do not expect any one to subsist upon the air of the past—even sympathetically; least of all, the poet or the artist. But this statement, that “geology tells us nothing really interesting,” is certainly fatal to Mr Ruskin’s undivided authority as a teacher concerning a true understanding of the mountains and the poetry of the past in the present. Even his studies in mountain form will a little bewilder the student who is not already grounded in the science.¹

For these reasons artists in landscape who care about the matter might do well to alternate their studies in Ruskin with sound study of other more recent and more catholic writers on geology. The Scottish artist I would refer, first and foremost among the productions of living authors, to the ‘Scenery and Geology of Scotland’ of Dr Archibald Geikie, one of the most polished writers on geology since Playfair. I name also Professor Green of Oxford,—his ‘Physical Geology for Students’; and Sir Andrew Ramsay,—his ‘Physical Geology of Great Britain.’ And perhaps I may permit myself to say that in my father’s geological works he will find much—especially an ever-present sense of the *wonder* of past time—that will help him to read a deeper meaning into Mr Ruskin’s.

¹ I should do injustice to Mr Ruskin if I did not add that chap. xv. of his geological volume (vol. iv.) ‘On Crests,’ is the model of what descriptive writing of this kind ought to be. Eliminate only (or read in the light of more knowledge), 1st part, par. 7, and par. 20, second and third sentences.

Let me add a word, lastly, upon *studies*. I have thought carefully over the subject, but only to become more and more aware of my own inability to mark out *any* course of study in a case like this. If I had the fortune to be an artist, I believe I would endeavour to study geology on two sides—first, as the science of form and expression in mountains and rocks; secondly, as a poetic interpretation of past time. I would try to avoid mere technicality. Terms and classifications, no doubt, are indispensable, but they are only the floats, so to speak, by means of which we buoy up our knowledge to prevent it from sinking. But I would endeavour to cultivate what Sir Roderick Murchison used to call “an eye for a country.” I would probably learn enough of “structure” to be able to run a general section across some bit of country where the rocks are prominent, so as thoroughly to understand the organic connection that exists between the rocks at the surface and the masses underneath; and then—I would never run another. I would probably do a little rock-dissection by means of skeleton sketches from Nature, taking Mr Ruskin’s plate of the Crest of the Bouchard (Plate 34 in ‘Modern Painters,’ vol. iv.) as my model, and then I would never draw another diagram. I would learn enough, at any rate, to be able to interpret correctly the general impression which mountains convey at a distance; and I would make the varying aspects and colouring of rocks the object of special studies—not forgetting that it is possible to find varying expression, and, so to speak, a different handwriting, or perhaps even hidden *ciphers*, in the same rock from day to day.

Above all, and throughout all, I would endeavour to study geology at every point *as an exercise for the imagination*. If there were any kind of geological knowledge that, after sufficient trial, refused to take its place in the imagination, or to awaken any response there, I would discard it,—I should not deem it knowledge worth while my gaining.

And now I draw to a conclusion. I have tried to point the artist to geology, partly as a study that is closely in touch with his art, and partly as a study that is still in touch with the intellectual life of our time. If *he* will not learn from its teachings to add to his mental resources and the wealth of his imagination, I know not who can. There is something repellent to me in the *dictum* that the artist has to do only with the outsides of things. Expression, whether of the real or the ideal, can surely best be apprehended through a knowledge of the *nature* of things, as well as by a true and cultivated instinct.

There is, I am aware, one great school in art in modern days for which it seems to be claimed that *it*, at least, has need of no help from science—whether of geology or any other. I refer to the impressionist school. In mountain-drawing, for instance, impressionism presents us with outline and form, height and mass and distance, shadows and mist and snow; and truly it might seem at first sight as if artists of that school have learned all that they need to know. We are told that they give us “values,” not details. I do not insist on the fact—true, so far as it goes—that the snow-drifts are *shaped* by the form of the hollows, and

the mist by that of the valley and the hillside. But it does seem to me strange if men should propose to attain the maximum of ideality through the minimum of knowledge. I am aware that genius delights to appear to set at naught all rules; but I have been accustomed to think that he who would give us the *impression* without the detail, has need most of all to gain the power of reading the *expression*; that you cannot idealise the thing you are ignorant of—succeeding, at best (if the attempt be made), in putting something else in its place. So long as the artist is willing to restrict himself to the superficies of things, his eye for form and colour, for effects and combinations of effects, is perhaps enough to serve his turn; but the moment he endeavours to give us real expression of character, he cannot, surely, do without some knowledge. I plead even with him for some judicious study of the *erdkunde* in this sense.

The great message of geology to the nineteenth century has already been delivered. Little more than fifty years ago the horizon of ordinary thinking men was bounded, as if by a wall, by a line drawn only six thousand years back in the past. The widening of that horizon to its true bounds was one of the greatest intellectual achievements of the century—perhaps of all time. No longer hemmed in by the wall of the Mosaic chronology,—part of that “wall of ordinances” that was to be broken down—we can lift our eyes to a distance so extreme, that we cannot in the dimness distinguish land from cloud, or sea from haze—the mind’s eye losing itself, wondering, in the supreme firma-

ment of God's eternity. I would fain have the painter, of whatever school he may be, more cognisant of that distance, as well as of much that lies nearer.

How extraordinary have not *his* contributions been to the civilising—I had almost said the spiritualising—of mankind! He shows us the shadows and the sunlight where they dance together under the trees; he shows us the motion of wind in cloud and smoke, and waving branches, and the maiden's floating hair; he gives to us the feeling and almost the music of the sound of the brook and of the church bells ringing across the fields; the ether of heaven he can make as if to send its vibrations sensibly to our vision; he gives to spirit form, and to poetry shapes; he shows us the soul of man in his eyes; he gives to the meanness of human life mystery, and to its foulness tragedy. There is nothing on earth that shall be hid from him that the sun looks upon or the shadows rest upon. He will prove himself more and more, I am convinced, one of the vital powers in the higher education of coming generations. But I am fain that he should know more of the *ways* of Nature as he goes on

“ Striving to match the finger-mark of Him
The immeasurably matchless.”

And I would fain point him to one door that up to the present he has allowed to remain closed, and ask him if he will not try to enter therein—into a region where there are other shadows, and a vast haze and vast silence—that he may come forth,

and, if it be possible, show us in new and exquisite ways things that we have not known concerning the poetry of the past and the truth that has been since the beginning. Then may he have power to give to the rocks more of their strength, more of their vast age, more also of their evanescence. He may show us something of the *secret* of the hills and the mystery which their depths embosom; and we shall perhaps see more clearly what at present we are able only to divine, that as Paul said to the Galatians concerning another matter—"These things *also* are an allegory."

A P P E N D I X.

I.

DR JOHN BROWN. ‘*HORÆ SUBSECIVÆ*,’
“Notes on Art,” pp. 229-231.

“ONE other heresy I must vent, and that is to protest against the doctrine that scientific knowledge is of much direct avail to the artist ; it may enlarge his mind as a man, and sharpen and strengthen his nature, but the knowledge of anatomy is, I believe, more a snare than anything else to an artist as such. . . . Painting has to do simply and absolutely with the surfaces, with the appearances, of things ; it knows or cares nothing for what is beneath and beyond, though, if it does its own part aright, it indicates them. Phidias and the early Greeks, there is no reason to believe, ever dissected even a monkey, much less a man ; and where is there such skin and muscle and substance and breath of life ? When art became scientific, as among the Romans, and lost its heart in filling its head, see what became of it ! —anatomy offensively thrust in your face, and often bad anatomy—men skinned and galvanised, not men alive and in action. In the same way in landscape : do you think Turner would have painted the strata in an old quarry, or done Ben Cruachan more to the quick, had he known all

about geology, gneiss and greywacke, and the Silurian system? Turner might have been what is called a better informed man, but we question if he would have been so good, not to say a better, representor of the wonderful works of God, which were painted on his retina—the true *camera lucida*, the chamber of imagery leading from the other, and felt to his finger-tips. No. Science and poetry are to a nicety diametrically opposed; and he must be a Shakespeare and a Newton, a Turner and a Faraday, all in one, who can consort much with both without injury to each. It is not what a man has learned from others, not even what he thinks, but what he sees and feels, which makes him a painter."

II.

MR BRITON RIVIERE ON SCIENCE IN RELATION TO PAINTING.

Even Mr Ruskin, who has written so much on the relations of art to religion, morals, and use, has not successfully defined its relation to science. His attempt in that direction in "The Eagle's Nest" is greatly wanting in his usual suggestiveness. I append, therefore, the following admirable passage from Mr Briton Riviere's opening address to Section A of the Edinburgh Art Congress, which, I believe, is generally accessible only to members of the Congress. I regret that I did not see it sooner:—

"Whatever may have been done in other lines of human energy during the Victorian age, there can be no question that its most remarkable achievements, both theoretical and practical, have been those of science. . . . The art of the painter has not escaped its influence. On one side, and a very important one—that of Realism—the side which furnishes the language,—*i.e.*, the signs and symbols which

express the idea of the artist,—there is a wide front open to the influence of science; and on that side art has not been slow or unwilling to follow the advice of science, or ungrateful for the valuable help it has afforded. According to my theory, this supremacy of science would have influenced art under any circumstances, but it has been able to do so through the very method and language of art itself.

“Will this influence help or retard the influence of art? My answer is, it may do either, according to the manner in which it is received and used by the artist. If the painter resolutely holds the belief that painting is a language, and a work of art—the expression of an idea—and uses science and all that it has discovered and teaches, to enable him better to understand his signs and symbols,—viz., the material facts of nature, so that by means of them he may express himself correctly, just as a writer has behind him the philologist to busy himself about the derivation and meaning of words, and the grammarian to show him how to place these words so as to produce the meaning he requires,—if, I say, the painter so receives and uses the knowledge and appliances of science, then I think the cause of art will be much advanced by science, and works produced under its influence will be stronger and richer than they could possibly have been without it. On the other hand, if the painter allows this scientific knowledge of the material or realistic part of his work to obscure the purely artistic or ideal part of it, to obscure instead of to intensify the *idea*; and if, carried away by the material wonders of the ‘thing’ which science has unfolded, he forgets the “thought” altogether, then assuredly, however true he may have shown himself to be to the cause of science, that of art will suffer at his hands—indeed, may be lost altogether. For I feel sure that most of my brother artists will agree with me that it is possible for a picture to be scientifically true and have no art at all in it; and, on the other hand, to contain several scientific blunders, and yet be a great work of art.

"Upon the right use of science—this great, at present leading, influence of the age—much depends. The intelligent observer who wishes to become conversant with art matters will do well to acquaint himself with the line where science ends and art begins, and how far science may be said to legitimately influence art. The simple narrative of a fact *per se* will not constitute a work of art any more than a photograph can be considered a work of art, and for the same reason—viz., the material constituents of both are absolutely impersonal; and it is the personality of the artist—the impress on the work of the artist's own mind and intention adequately expressed—which gives the art. In this age of scientific observation it is highly important, when we consider the art of painting, to bear in mind this distinction. So much is known now about the nature and construction of things, and such knowledge is so fascinating, not only to any intelligent observer, but also to the painter, that he may well stray into the pursuit of this knowledge for its own sake, and forget that as a painter he must only pursue it so far as his art requires. We can well understand the position of those who seem to hold that the patient and careful transcript and narration of facts, or what seem to be facts, in form and colour, will constitute a work of art, while we wholly dissent from their opinion. Rather would we hold that these facts, heaped up before us in such generous profusion by science, are to us painters by no means an end in themselves, but only a means towards an end. It is the personality of the artist, the impress on the work of the artist's own mind and intention, adequately expressed, which gives the art."—Transactions of the National Association for the Advancement of Art, Edinburgh Meeting, 1889, p. 34.

III.

SCIENCE AND THE POETS.

Almost nothing as yet seems to have been written about the scientific poets. Whilst this little book was in the hands of the printer I was turning over some pages of the file of the 'Witness' newspaper, of which my father was the editor : in one of its forgotten columns I found these suggestive sentences. I make no apology for transcribing them :—

" Science and Poesy are not antagonistic, though from various causes they have come to be so regarded at the present time. One of these causes is to be found, we think, in the circumstance that none of the great British poets of the half-century which has just come to its close were men of science. Scott, Byron, Wordsworth, varied as their conceptions were, saw but the outside of external nature. Goethe was a man of a different stamp. He could look upon roses and lilies as the poet looks upon them ; but he could look at them also with other eyes ; and his conception of the plant as such has been received by botanists all over the world as the truly scientific one. Of a similar stamp were the great epic poets. Virgil was a master of all the science of his age, and 'proposed using his talent in poetry,' says his biographer, 'only for a scaffolding to build a convenient fortune, that he might prosecute with less interruption the scientific studies to which his genius peculiarly led him.' Milton also possessed the scientific mind in an eminent degree ; and in his tractate on Education chalks out the scheme of a severe course in physical philosophy, as indispensable to the full development of intellect in his pupils, but without once suspecting, apparently, that an acquaintance with 'the principles of geometry, astronomy, and geography,' or with the 'history of meteors, minerals, plants, and living creatures,' could in any degree militate against the exercise of the poetic faculty. His contemporary, Cowley, was of

a similar mind, as may be seen in his ‘Proposition for the Advancement of Experimental Philosophy.’ Nay, there is scarce any literature, ancient or modern, of the higher and more cultivated kind, that has not its philosophic poems.

. . . The idea that there exists an antagonism between science and poetry seems to be an idea very much restricted to the present age. . . . Whenever a truly great poet arises —one that to a powerful imagination adds a profound intellect—he finds science, not his enemy and his rival, but a sedulous caterer and friend.”—HUGH MILLER, ‘The Witness,’ January 15, 1851.

IV.

MR RUSKIN’S GEOLOGY CONTRASTED WITH HIS INTUITION.

According to ‘Deucalion,’ the earth’s history, past and present, can be summarised as of three ages, comparable to the ages of youth, strength, and decrepitude in man. In the first period rocks now hard were soft; and the masses of which the mountains we now see are composed were lifted and hardened in the positions they now occupy; though in what forms, we can no more guess now than we can the original outline of the block from the existing statue. Out of these masses, in the *second period*, the mountains we now see were hewn and worn, by forces for the most part differing both in mode and violence from any now in operation. In the *third* or historical period, the valleys excavated in the second period are being filled up, and the mountains hewn in the second period are being worn or ruined down.—(‘Deucalion,’ pp. 31-34 — “The Three Eras.”)

Contrast with this strange geology, which, however, cer-

tainly gives us some partial and blurred reflection of the truth, Mr Ruskin's wonderful description of the slaty crystalline rocks (the hardest problem, perhaps, that has ever yet yielded its meaning to the geologist) in volume iv. of 'Modern Painters' (pp. 119-121), and then ask whether his intuition be not greater than his science:—

"When the compact crystallines are about to pass into the slaty crystallines, their mica throws itself into . . . bands and zones, undulating round knots of the other substances which compose the rock. . . . There is a subdued but continual expression of *undulation*. This character belongs more or less to nearly the whole mass of the slaty crystalline rocks; it is one of exquisite beauty, and of the highest importance to their picturesque forms. It is also one of as great mysteriousness as beauty. . . . I might devote half a volume to a description of the fantastic and incomprehensible arrangements of these rocks and their veins; but all that is necessary for the general reader to know or remember is the broad fact of the undulation of their whole substance. For there is something, it seems to me, inexpressibly marvellous in this phenomenon largely looked at. It is to be remembered that these are the rocks which, on the average, will be oftenest observed, and with the greatest interest, by the human race. . . . Well, we begin to examine them. . . . We yield ourselves to the impression of their eternal, unconquerable stubbornness of strength; their mass seems the least yielding, least to be softened, or in any wise to be dealt with by external force, of all earthly substance. And behold, as we look further into it, it is all touched and troubled, like waves by the summer breeze; rippled, far more delicately than seas or lakes are rippled: *they* only undulate along their surfaces —this rock trembles through its every fibre, like the chords of an Æolian harp, like the stillest air of spring with the echoes of a child's voice. Into the heart of these great mountains, through every tossing of their boundless crests, and deep beneath all their unfathomable defiles, flows that strange quivering of their substance. Other and weaker

things seem to express their subjection to an infinite power only by momentary terrors, as the weeds bow down before the feverish wind, and the sound of the going in the tops of the taller trees passes on before the clouds, and the fitful opening of pale spaces on the dark water, as if some invisible hand were casting dust abroad upon it, gives warning of the anger that is to come ; we may well imagine that there is indeed a fear passing upon the grass and leaves and waters at the presence of some great spirit commissioned to let the tempest loose : but the terror passes, and their sweet rest is perpetually restored to the pastures and the waves. Not so to the mountains. They, which at first seemed strengthened beyond the dread of any violence or change, are yet also ordained to bear upon them the symbol of a perpetual Fear : the tremor which fades from the soft lake and gliding river is sealed, to all eternity, upon the rock ; and while things that pass visibly from birth to death may sometimes forget their feebleness, the mountains are made to possess a perpetual memorial of their infancy —that infancy which the prophet saw in his vision : ‘I beheld the earth, and lo, it was without form and void ; and the heavens, and they had no light. I beheld the mountains, and lo, they *trembled* ; and all the hills *moved lightly*.’”

This is one of the most remarkable passages in the literature of geology. Many of these rocks (whether we call them “slaty crystallines” with Ruskin, or “crystalline schists” with the geologist) have actually been *subjected* to stresses by which their substance has been affected in almost every part, and altered in almost every grain—in the same way that iron is altered, or sheared, particle by particle, when it is placed in the jaws of a powerful machine. The substance of these rocks has in many places actually been caused to *flow*, as the water of the mid-current of a river flows over that part of the stream which is impeded by the friction of its bed ; there has actually *been*, incredible as it may seem, a slow subterranean rippling of currents of stone moving under the

inconceivable pressure of the contraction of the earth ; and we marvel how nearly Ruskin, decades of years ago, came to the fact. This poet, during months spent alone among the Alps, opened his heart to the truth of Nature, and the truth, though he knew it not, imprinted itself there.

When he reasons concerning phenomena, on the other hand,—even concerning so simple a thing as the scooping of a pool at the turn of a stream—we find him helpless. “I stared at it, and stared, and the more I stared at it the less I understood it. . . . It is inconceivable how it is not filled up : much more is it inconceivable how it should be cut deeper down” (*Deucalion*, p. 216). Streams, he concludes, are doing nothing to excavate their present valleys : they are filling, not deepening, “alike tarn, pool, channel, and valley.” The mountains were hewn into their present forms “as if by a sword-stroke through flesh, bone, and marrow.” There are many things in ‘Modern Painters’ with which this conclusion does not at all agree ; but Mr Ruskin inspired is a different man from Mr Ruskin weighing his own inspirations. On the whole subject of denudation he was in advance of his time—in the first half of the century.

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